Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Mitigation of Orbital Debris in the New Space Age	)	IB Docket No. 18-313
	)	

COMMENTS OF EUTELSAT S.A.

Eutelsat S.A. ("Eutelsat") submits these comments on the Federal Communications Commission ("FCC" or "Commission") notice of proposed rulemaking ("NPRM") seeking to adopt new rules governing orbital debris mitigation for geostationary satellite orbit ("GSO") and non-geostationary satellite orbit ("NGSO") systems.[1] Eutelsat, together with its subsidiaries, is a global satellite operator licensed by France, the Commission, and other administrations to operate 34 satellites of different manufacturers and models, transponder designs, and on-orbit service periods. Thus, Eutelsat has a unique perspective on the implications of the issues raised in the NPRM for domestic and foreign satellite operators.

I. DISCUSSION

Eutelsat welcomes the Commission's efforts to address orbital debris and related satellite control issues in this proceeding. A safe and secure orbital environment is essential for all satellite operators. It means a sustainable space environment for the next generation, the preservation of orbital resources, the ability to provide uninterrupted services in furtherance of the Commission's public interest objectives, and the prevention of operations which could jeopardize space-based systems integrity and service continuity requirements.

[1] *See Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking, FCC 18-159, IB Docket No. 18-313 (rel. Nov. 19, 2018) (the "NPRM").

Eutelsat notes that GSO satellite orbital debris mitigation issues are well-settled and based upon internationally agreed principles, and Eutelsat operates its fleet in compliance with applicable requirements. Although orbital debris issues associated with the proliferation of NGSO satellites and constellations clearly must be addressed, only limited update of effective orbital debris principles for GSO satellites should be adopted in the context of this proceeding, and no added requirements should put at risk already agreed GSO orbital debris mitigation approaches.

Eutelsat also notes that the NPRM addresses satellite control issues in the context of mitigating orbital debris issues. Specifically, the Commission proposes to require the use of encryption for telemetry, tracking and command ("TT&C") communications to prevent satellite hacking (and the resulting orbital debris concern). In a similar vein, Eutelsat submits that limiting public information regarding specific satellite control frequencies to prevent jamming (and the resulting orbital debris concern) is a logical outgrowth of the satellite control proposal included in the NPRM.

A. Information Regarding Deployment Devices and Their Debris Mitigation Measures Should Not Be Required To Obtain a Satellite License or Market Access

In the NPRM, the Commission proposes to require satellite operators seeking a license or market access to disclose details regarding possible debris that may be released, not by the satellite itself, but by the device used to deploy the satellite from its launch vehicle.[2] However, GSO satellite operators, in particular, are not responsible for launch procedure and do not choose the specific deployment device used for the launch of their satellite. Additionally, given the need for prior authorization and long lead-times for GSO satellite procurement, the launcher and

[2] *See* NPRM at ¶21.

launch procedure may well be unknown when a satellite license application/market access petition is submitted. Even if known, they may change before the launch.

It is also not clear that Commission review of launcher or deployment device operations can reach beyond spectrum use considerations. Assessment and mitigation of risks for orbital debris related to the launcher are within the purview of the authorities that must approve the launch itself. Indeed, the launcher may not even be within U.S. jurisdiction or regulatory authority, as in the case of a foreign launcher using a spaceport in a foreign country. Furthermore, market access may be requested long after the satellite has been launched, making mitigation of risk associated with the launch potentially inapplicable.

The Commission has extended its licensing and market access review to satellite orbital debris mitigation and end-of-life measures to ensure a level competitive playing field between U.S. and foreign operators with respect to satellite operating standards, among other reasons.[3] While such issues are the subject of general international agreement and compliance is within the satellite operator's control, launcher and deployment device design and operation are not. Instead, they are unique to the launcher, under the launch provider's control, and subject to review by regulatory authorities approving the launch. For these reasons, such information should not be included as part of a satellite license application or market access request.

B. Additional Information Requirements and Metrics for Collision Risk with Small Debris Should Not Be Applied to GSO Satellites

In the NPRM, the Commission considers whether the risk of NGSO satellites becoming a source of debris by collisions with small (<10 cm) debris necessitates more than a statement that

[3] *See* Mitigation of Orbital Debris, Second Report & Order, IB Docket No. 02-54, FCC 04-130 (rel. June 21, 2004) at ¶¶ 92-97.

the space station operator has assessed and limited this probability.[4] The Commission seeks comment on whether the NASA Standard metric[5] should be applied to calculating risk of collision with debris of this size, but the proposed rule does not appear to limit applicability to NGSO satellites.[6]

Although Eutelsat acknowledges that very small debris has the potential to cause damage, there is little basis to extend the proposed rule to GSO satellites. The orbital dynamics are substantially different for GSO satellites and the risks posed by small debris are materially lower. Further, the NASA Large Constellations Study is focused on NGSO constellations and therefore is not relevant for GSO satellites. Also, as the NPRM acknowledges, there currently is no database of objects of such small size.

It is unclear how a risk of collision with such objects could be calculated reliably and there is no basis to apply this requirement to GSO satellites. Therefore, the Commission should not apply the proposed requirement to provide a metric for collision risks to GSO satellites.

C. The Commission Should Make Decisions Regarding GSO Satellite License Term Extensions on a Case-by-Case Basis

In the context of GSO license extensions,[7] the NPRM considers limiting the duration of the satellite license extensions to five years and requiring an estimate of total remaining satellite lifetime, along with certifications and explanations of potential deficiencies. Eutelsat opposes the limitation of an extension to five years and the rejection of such requests where a single point of failure may exist. Instead, Eutelsat suggests that extension requests continue to be examined

[4] *See* NPRM at ¶¶26-27.

[5] *NASA Standard* at 32, Requirement 4.5-2.

[6] *See* proposed Section 25.114(d)(14)(ii).

[7] *See* NPRM at ¶¶63-67.

by the Commission on a case-by-case basis and that multiple extension requests should be considered in appropriate circumstances.

Modern satellite designs frequently realize an operational lifetime beyond the 15-year period traditionally contemplated. Furthermore, multiple extensions may result from conservative estimates regarding operational lifetime, improvements in satellite flight management, and even the use of new electric propulsion designs, so it should be made clear that the number of extensions is not limited. An arbitrary limitation on extensions, in duration or number, would unnecessarily prevent operators from fully using their orbital assets to serve U.S. consumers.

If the Commission codifies information to be provided in license extension requests, it should permit both certifications regarding the satellite's safety and end-of-life procedures, and narrative descriptions explaining the reasonableness of requested extensions. Ultimately, this would allow satellite operators to best manage their orbital assets to the end of their life cycle and provide services to U.S. consumers, while also preventing the loss of control of the satellite to mitigate the risk of debris.

D. The Commission Should Consider Issues Related to Satellite Control in the Context of the Present-Day Operating Environment

1. Formal Coordination of TT&C During Orbit-Raising Should Not Be Required of GSO Satellite Operators

In the NPRM, the Commission suggests that TT&C during orbit-raising and end-of-life maneuvering should no longer be allowed on a non-interference basis, but instead be specifically

coordinated among satellite operators.[8] Eutelsat does not support this proposal given current operational practices for GSO satellites.

Current best practices already include discussions initiated by satellite manufacturers or operators with potentially affected operators for orbit-raising and end-of-life maneuvering to prevent harmful interference associated with these intermittent, short-term operations. In addition, orbit-raising maneuvers may not be the responsibility of the satellite operator, but of the satellite manufacturer who remains in charge of the satellite until it is delivered on GSO orbit and in healthy operational condition.

Formal coordination in these circumstances may not be warranted and it is not clear what rules would be applicable, or what demonstration of coordination would have to be submitted. Furthermore, potential objections could have material adverse consequences with no real benefits resulting from the proposed change.

Eutelsat believes that current practices have worked well and the Commission is always in a position to address potential interference concerns should they arise. Accordingly, there appears to be little benefit from moving away from the existing non-interference approach to requiring formal coordination for these limited, intermittent operations.

2. Encryption of TT&C Need Not be Necessary by Rule

Eutelsat recognizes that communications satellites are subject to cybersecurity risks. The danger of intrusion into command functions is particularly serious as it can lead to improper and unauthorized orbit alteration, with the attendant resulting risk of collision or radiofrequency interference. Because voluntary operator encryption is already commonplace, the Commission's

[8] *See* NPRM at ¶¶70-71.

proposed encryption requirement[9] could be viewed as mere codification of current practice. On the other hand, a legitimate question is presented as to whether encryption standards should be mandated by rule regardless of the individual satellite's intended application.

For satellites providing government security services, the justification for mandatory encryption standards is clearly established. Space is increasingly recognized as a new theater of cyber conflict. For instance, the U.S. Government already requires satellites on which services are provided to the Government to meet standards designed to prevent hacking of their transmissions or even efforts to gain control over their command functions. The U.S. security standard is issued by an inter-agency Committee on National Security Systems ("CNSS") which includes representatives of the Defense Department and the military branches, the National Security Agency, the CIA, FBI, and National Security Agency. CNSS Policy No. 12 is entitled "National Information Assurance Policy for Space Systems Used to Support National Security Missions." Among its requirements is the encryption of both command and telemetry functions on satellites providing national security services to the U.S. Government. Because of the constantly evolving specter of cyber-security concerns, CNSSP-12 continues to be updated (most recently in 2018).

However, encryption of tracking and telemetry signals is not universally implemented, but rather applied on a case-by-case basis. Different administrations have different approaches to the issue of encryption and appropriate protection and preservation of satellite control.

In view of the foregoing, Eutelsat believes that current best practices with respect to satellite vehicle and transmission control for the commercial market in general already effectively address the issue of satellite hacking. If the Commission were to impose such

[9] *See* NPRM at ¶¶74-75.

requirements, however, they should be limited to command signals only. In no case does Eutelsat envision how control of tracking functions could contribute to maintaining the integrity of the control of the satellite or its transmissions and help prevent orbital debris. Finally, encryption requires investment in ground and onboard equipment and configuration, and any new encryption requirements should not be applicable to satellites already in orbit, under construction, or even at the design and procurement stage.

3. TT&C Frequencies Should Be Treated as Confidential and Should Be Submitted only where the Commission Must Authorize Their Use

The Commission's proposal to preserve satellite control via TT&C encryption highlights the importance of protecting command transmissions, as well as telemetry and tracking links. While encryption can prevent unauthorized hacking of a satellite, it does not address potential loss of satellite control that may result from jamming TT&C frequencies. Eutelsat believes this important issue should be addressed in the context of this proceeding as a logical outgrowth of the Commission's proposals related to preserving satellite control.

To mitigate the potential for jamming TT&C frequencies and having an uncontrolled satellite be a source of orbital debris, Eutelsat urges the Commission to treat satellite TT&C frequencies as confidential. Specifically, the Commission should permit U.S.-licensed satellite operators and earth station operators to submit specific TT&C frequency information separately with a request for confidential treatment. Furthermore, the Commission should require non-U.S.-licensed satellite operators to submit information regarding specific TT&C frequencies only to the extent that TT&C is conducted from the United States and, in that case, permit similar requests for confidential treatment.

The operational requirements and regulatory conditions for TT&C links have changed over time. Once solely limited to the band edge due to higher interference potential, TT&C operations can now be conducted anywhere throughout the service bands subject to coordination or to assurance that the operations will cause no more interference or require greater protection from interference than ordinary communications traffic on the same satellite network.[10] In addition, satellite designs now facilitate operation of TT&C links on various frequencies throughout permissible bands, facilitating flexibility and interference resolution.

At the same time, the threat of satellite signal jamming has increased dramatically. The availability of low-cost antennas and related equipment make it much easier for rogue actors to disrupt command signals and monitor telemetry and tracking links. In this context, however, the greatest threat is posed by detailed, readily available TT&C frequency information for every U.S.-licensed satellite and foreign satellite required to submit such information to the Commission. Rogue actors can easily determine with precision which frequencies to jam or monitor in an effort to disrupt active satellite control.

The Commission recognizes the critical nature of TT&C operations and, indeed, has determined that similarly detailed information regarding U.S. telecommunications infrastructure should not be made routinely available for public inspection.[11] Eutelsat is not advocating such a formal determination in the context of this proceeding, although such a determination may be warranted in the future. Rather, Eutelsat urges the Commission to apply its confidential treatment process to critical satellite control information and not require submission of such information by non-U.S.-licensed satellite operators except where the Commission must

[10] *See* 47 C.F.R. 25.202(g).

[11] *See* 47 CFR 0.457(c)(1).

authorize the use of TT&C spectrum (either as part of a market access request or a U.S. earth station application seeking to support TT&C for a non-U.S.-licensed satellite).

a. Confidential Treatment for Specific TT&C Frequencies

Affording confidential treatment to specific TT&C frequencies in satellite and earth station applications, as well as U.S. market access requests of non-U.S.-satellite operators, will neither complicate the interference environment nor deprive potentially affected satellite operators of their notice and comment rights. First, substantive compliance with the Commission's TT&C rules and policies can be achieved without public disclosure of specific TT&C frequencies. Because the information will be submitted on a confidential basis, the Commission can determine whether TT&C will be conducted at the band edge or elsewhere in the service band at levels that do not cause additional interference or require additional protection.

Second, in the context of interested party comment on compliance with TT&C rules and policies, an applicant or petitioner would still include a general description, broad frequency range, and basis for its TT&C operations (including either (i) operation at the same power and protection levels as service links; or (ii) at other coordinated levels).[12] In the former case, review and comment on service link characteristics would apply equally to TT&C links. In the latter case, potentially affected interested parties would be able to comment on claimed coordination status of the applicant or petitioner. In sum, affording confidential treatment to specific TT&C frequencies will protect U.S. and non-U.S.-licensed satellites from the threat of jamming to disrupt satellite control, while at the same time ensuring compliance with the Commission's

[12] Similarly, earth station applicants can include a broad frequency range and representative link budget, as appropriate, in the context of requesting authority to provide TT&C support for a non-U.S.-licensed satellite.

substantive TT&C rules and policies, and other administrative requirements. To the extent any dispute or potential interference arises that cannot be otherwise resolved, the Commission will have the information available to it to facilitate an operator-to-operator resolution.

b. Limited Submission of TT&C Frequencies for Non-U.S.-Licensed Satellites

As a general matter, requests for U.S. market access include all information related to proposed service to and from the United States. For example, except in the context of serving satellite mobility terminals (earth stations in motion or "ESIMs"), market access requests may not include information regarding a satellite beam that does not serve U.S. territory.[13] Similarly, the Commission should seek information regarding specific TT&C frequencies of non-U.S.-licensed satellites only to the extent that TT&C is conducted from the United States and, in that case, afford confidential treatment as discussed above.

Limiting submission of specific TT&C information will enhance security and minimize the potential for inadvertent or unauthorized disclosure of such information, facilitating satellite control and security. Such an approach also would not alter the interference environment or otherwise deprive the Commission of information necessary to perform its regulatory functions. Non-U.S. satellites are subject to the requirements of their licensing administrations and, to the extent TT&C operations are performed outside the United States, no Commission authority would be required. Accordingly, consistent with the principle of protecting critical TT&C information, the Commission should not require submission of specific TT&C frequencies (even under confidential treatment) unless TT&C operations are performed from the United States.

[13] *See, e.g.,* Satelites Mexicanos, S.A. de C.V., Call Sign S2926, File Nos. SAT-LOI-20140617-00070 and SAT-MOD-20161003-00096 (initial market access grant for one satellite payload and subsequent grant for additional bands and beams).

E. The Commission Should Not Adopt Indemnification or Insurance Requirements for Foreign Satellites

The Commission seeks comment on whether satellite licensees should indemnify the United States against any costs associated with a claim brought against the United States related to the authorized satellites. The Commission also seeks comment generally on the costs and benefits of insurance as an economic incentive for orbital debris mitigation.[14] Regardless of the Commission's ultimate decision with respect to U.S.-licensed satellites, Eutelsat opposes indemnification of the United States and insurance requirements in the context of foreign-licensed satellites seeking U.S. market access.

There is no basis to apply such a requirement to foreign satellites. Any indemnification and insurance requirement would not be relevant for non-U.S. satellites because these satellites are already covered by the liability policies of their national authority. Only satellites licensed or registered by the United States under the Convention on International Liability for Damage Caused by Space Objects of 1972 would implicate potential U.S. liability.[15] Therefore, should the Commission decide to impose indemnification or insurance requirements, they should not be applied to non-U.S. satellites.

F. Regulatory Oversight by a Satellite's National Licensing Authority Should Continue to Satisfy the Requirements for Non-U.S.-Licensed Satellites

The NPRM asks whether foreign satellites should be subject to the same orbital debris mitigation requirements when requesting market access to ensure a fair, competitive

[14] *See* NPRM at ¶¶76-81.

[15] The Commission can address on a case-by-case basis the unique circumstance where (i) the United States registers the satellite but is not the licensing administration; or (ii) does not register the satellite but is the licensing administration.

marketplace. It also asks whether there should there be an exemption for indemnification or insurance requirements if operators are already subject to such requirements by their licensing administration.[16]

Eutelsat points out that non-U.S. satellites, when licensed by their national authorities, are already subject to their licensing administration's national policy with respect to orbital debris risks and mitigation. The Commission should continue to avoid applying any duplicative, and possibly conflicting, requirements on non-U.S. satellites seeking market access that are subject to direct and effective regulatory oversight by their national licensing authority.[17] Eutelsat also encourages continued international cooperation to preserve a common framework of regulation for orbital debris prevention and management, such as that promulgated by the Inter-Agency Space Debris Coordination Committee (IADC).

Continued development and promotion of internationally recognized practices would ease the regulatory burden on the Commission and recognize the regulatory responsibility of satellite licensing administrations to ensure compliance with such standards. Eutelsat believes that the Commission's rules should reflect this reality, among other reasons, to ensure that Commission oversight of U.S.-licensed satellites is reciprocally and fully recognized and respected in foreign markets around the world.

III. CONCLUSION

Eutelsat appreciates the Commission's examination of orbital debris mitigation and satellite control issues, especially in the context of new NGSO satellite operations, but

[16] *See* NPRM at ¶¶85-87.

[17] *See* 47 C.F.R. 25.114(d)(14)(v): "For non-U.S.-licensed space stations, the requirement to describe the design and operational strategies to minimize orbital debris risk can be satisfied by demonstrating that debris mitigation plans for the space station(s) for which U.S. market access is requested are subject to direct and effective regulatory oversight by the national licensing authority."

emphasizes that any modification of well-settled GSO satellite rules should be driven by specific requirements and not simply applied in connection with the need to address new challenges associated with NGSO systems. In particular, Eutelsat requests that the Commission consider:

(i) not requiring satellite operators seeking a license or market access to provide information regarding deployment devices and their associated debris mitigation measures, which are regulated by other governmental authorities;

(ii) not applying a metric for collision with small debris to GSO satellites;

(iii) continuing to make decisions regarding GSO satellite license term extensions on a case-by-case basis;

(iv) not requiring GSO satellite operators to formally coordinate TT&C during orbit-raising and instead continue to authorize such operations on a non-interference basis;

(v) not adding a requirement for encryption of TT&C frequencies**;**

(vi) treating specific TT&C frequencies as confidential in satellite license or market access applications and not requiring the submission of such information for non-U.S. satellites unless TT&C is conducted from the United States;

(vii) not applying indemnification or insurance requirements to non-U.S.-licensed satellites; and

(viii) continuing to recognize effective regulatory oversight by the licensing authority of non-U.S.-licensed satellites to satisfy orbital debris mitigation and liability requirements.

Respectfully submitted,

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